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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/043,561	01/08/2002	Donald J.K. Olgado	AMAT/6060/CALB/COPPER/PJS	7947

32588 7590 06/24/2003

APPLIED MATERIALS, INC.  
2881 SCOTT BLVD. M/S 2061  
SANTA CLARA, CA 95050

EXAMINER

CHEN, KIN CHAN

ART UNIT PAPER NUMBER

1765

DATE MAILED: 06/24/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No. 10/043,561	Applicant(s) OLGADO ET AL	
	Examiner Kin-Chan Chen	Art Unit 1765	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 27 May 2003.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-46 is/are pending in the application.
- 4a) Of the above claim(s) 31-37 and 41 is/are withdrawn from consideration.
- 5) ☒ Claim(s) 10-18 and 44 is/are allowed.
- 6) ☒ Claim(s) 1-9, 19-30, 38-40, 42, 43, 45 and 46 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s) _____   |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) <u>2</u> | 6) <input type="checkbox"/> Other:  |

## **ETAILED ACTION**

### ***Election/Restrictions***

1. Applicant's election with traverse of claims 1-30, 38-40, and 42-46 in Paper No. 4 is acknowledged. The traversal is on the ground(s) that apparatus claims would not require a separate search. This is not found persuasive because the method of group I and the apparatus of the group II are under different classification and involve different search that would be a serious burden on the examiner.

The requirement is still deemed proper and is therefore made FINAL.

### ***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-8, 19-29, 38, 39, 40, 42, 43, 45, 46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Roberts et al. (US 6,461,914; hereinafter "Roberts") in view of Contolini et al. (US 5,486,234; hereinafter "Contolini") or Nishibe et al. (US 6,299,697; hereinafter "Nishibe").

In a method of forming semiconductor device, Roberts teaches that planarizing a metal conductor layer on a top surface of a substrate may use wet or dry etch process

etch process (col. 3, lines 40-44). The metal conductive layer may comprise copper. Roberts is not particular about the process of wet or dry etching. Therefore, it would have been obvious to one with ordinary skill in the art to use conventional wet etching process, dry etching process or **combinations thereof** (such as perform them sequentially).

Unlike the claimed invention, Roberts does not disclose the details of the conventional wet etching process such as placing the substrate on a rotatable substrate support, rotating the substrate support, contacting the top surface of the substrate with a liquid etching composition. In a method of wet etching / wet processing of the substrate, Contolini (col. 4, lines 17-45) or Nishibe (col. 2, lines 1-10; col. 3, lines 18-34) teaches the details of the conventional wet etching process such as placing the substrate on a rotatable substrate support, rotating the substrate support, contacting the top surface of the substrate with a liquid etching composition such as nitric acid or peroxy compound (claims 5, 25, 42, 43, 45, and 46), using top nozzles (claims 6, 26). Because it is a conventional wet etching process and because it is disclosed by Contolini or Nishibe, hence, it would have been obvious to one with ordinary skill in the art to modify Roberts by using the process of Contolini or Nishibe in order to substantially reduce the metal removal rate.

As to claims 2, 8, 29, 40, and 43, because Roberts teaches planarizing a metal conductor layer on a top surface of a substrate using wet or dry etch process (col. 3, lines 40-44). Therefore, it would have been obvious to one with ordinary skill in the art to use conventional wet etching process, dry etching process or combinations thereof

(such as perform them sequentially). Therefore, the combined prior art teaches the limitations of claims.

The above-cited claims differ from the prior art by specifying well-known features (such as rinse after etching in claims 7 and 27) to the art of semiconductor device fabrication. A person having ordinary skill in the art would have found it obvious to modify the combined prior art by adding any of same well-known features to same in order to provide their art recognized advantages and produce an expected result.

Dependant claims 22 and 28 differ from the prior art by specifying various sizes and dimensions. Because same are merely a matter of choices of design and engineering depending on the product requirements and process, it would be obvious to one skilled in the art to use various sizes and dimensions in fabricating a semiconductor device in order to accommodate the specific product design and meet the product requirement.

Claims 38, 39, 45 and 46 differ from the combined prior art by specifying the planarizing and metal depositing are carried out on the same platform and in the same environment. However, it would have been obvious to one with ordinary skill in the art to perform operations using various engineering practice such as on the same platform then transfer to another processing cell for further processing because it is more efficient. Performing operations on different platform and environment requiring additional process steps without benefit.

4. Claims 9 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Roberts et al. in view of Contolini et al. or Nishibe et al. as applied to claims 1, 2, 19, 38 further in view of Yamamoto et al. (US 2002/0037684; hereinafter "Yamamoto") or Lo (US 5,667,630).

The discussion of modified Roberts, Contolini, and Nishibe from above is repeated here.

Unlike the claimed invention, Roberts, Contolini, and Nishibe do not teaches etching metal using the etchant gas comprises chlorine-containing material, bromine-containing material or fluorine-containing material. However, they are commonly used in the art of dry etching. Yamamoto (page 3, [0039] ) or Lo (col. 6, lines 38-60) is relied on to show same conventional etchant gas for metal etching. Hence, it would have been obvious to one with ordinary skilled in the art to use etchant gas of Yamamoto or Lo in the process of the combined prior art in order to provide their art recognized advantages and produce an expected result.

***Allowable Subject Matter***

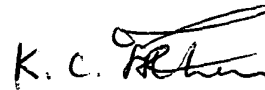
5. Claims 10-18 and 44 are allowed.

The following is an examiner's statement of reasons for allowance: The combined prior art does not teach the process comprising: disposing the metal conductive layer on the top surface of the substrate wherein the substrate has stray metal conductive material on other surface, removing the stray material using liquid

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etching. Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kin-Chan Chen whose telephone number is (703) 305-0222. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Benjamin Utech can be reached on (703) 308-3836. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-2934.



Kin-Chan Chen  
Primary Examiner  
Art Unit 1765

K-C C  
June 19, 2003